RECOVERY OF SO_2 FROM STACK GASES AS ELEMENTAL SULFUR BY A DRY FLUIDIZED ACTIVATED CARBON PROCESS. J. E. Davis, F. J. Ball, G. N. Brown, A. J. Repik, S. L. Torrence, Westvaco Corporation, Box 5207, N. Charleston, S. C. 29406.

A dry fluidized activated carbon process is being developed at the continuous pilot stage for recovery of SO_2 from waste or flue gases as elemental sulfur. The SO_2 is removed from the gases as sulfuric acid on carbon by sorption, catalytic oxygenation and hydrolysis. This is accomplished in a fluidized bed sorber cooled by water sprays at 150 to 300°F. An important development is the direct conversion of sorbed sulfuric acid to elemental sulfur by reaction with internally produced hydrogen sulfide. The product sulfur is recovered as molten sulfur by vaporization at 1000°F and condensation. The residual sulfur on the carbon is then reacted with hydrogen at 1000°F to produce the required hydrogen sulfide and complete the carbon regeneration. All regeneration steps employ fluid bed reactors. Adsorption of SO_2 at up to 25,000 cfh has been demonstrated on power boiler flue gases and simulated Claus tail gas. Feasibilities of the regeneration steps at comparable carbon rates have been shown and continuous integration of the pilot equipment is currently being achieved. Economic projections based on a 1000 MW conceptual design compare favorably with published figures on alternate measures to control SO_2 emissions. The current use of fluidized carbon beds to continuously desolvate air streams of up to 500,000 cfm with minute carbon attrition should expedite scale-up.